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Combat Deployment Is Associated with Sexual Harassment or Sexual Assault in a Large, Female Military Cohort

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A B S T R A C T

Background: Previous studies have examined the prevalence, risk factors, and health correlates of sexual stressors in the military, but have been limited to specific subpopulations. Furthermore, little is known about sexual stressors' occur rence and their correlates in relation to female troops deployed to the current operations in Iraq and Afghanistan.
Methods: Using longitudinal data from Millennium Cohort participants, the associations of recent deployment as well as other individual and environmental factors with sexual harassment and sexual assault were assessed among U.S. female military personnel. Multivariable analyses were used to investigate the associations.
Findings: Of 13,262 eligible participants, 1,362 (10.3%) reported at least one sexual stressor at follow up. Women who deployed and reported combat experiences were significantly more likely to report sexual harassment (odds ratio [OR], 2.20; 95% confidence interval [CI], 1.84 2.64) or both sexual harassment and sexual assault (OR, 2.47; 95% CI, 1.61 3.78) compared with nondeployers. In addition, significant risk factors for sexual stressors included younger age, recent separation or divorce, service in the Marine Corps, positive screen for a baseline mental health condition, moderate/severe life stress, and prior sexual stressor experiences.
Conclusions: Although deployment itself was not associated with sexual stressors, women who both deployed and reported combat were at a significantly increased odds for sexual stressors than other female service members who did not deploy. Understanding the factors associated with sexual stressors can inform future policy and prevention efforts to eliminate sexual stressors.

Introduction and Background

Unwanted sexual experiences have been associated with poor mental and physical health (Campbell, Lichty, Sturza, & Raja, 2006; Frayne, Skinner, Sullivan, & Freund, 2003; Murdoch, Pryor, Polusny, & Gackstetter, 2007; Smith et al., 2011), including posttraumatic stress disorder (PTSD; Haskell et al., 2010; Kimerling et al., 2010; Luterek, Bittinger, & Simpson, 2011; Vogt, Pless, King, & King, 2005) and unhealthy behaviors, such as alcohol abuse (Davis & Wood, 1999; Gradus, Street, Kelly, & Stafford, 2008). The issue of sexual harassment and sexual assault in the military has recently started to receive more attention from researchers (Suris & Lind, 2008), the Department of Defense (Lipari, Cook, Rock, & Matos, 2008; Lipari, Lancaster, & Jones, 2005), and media (La Bash, Vogt, King, & King, 2008; Risen, 2012). A recent, nationally representative survey of active duty U.S. military personnel found that 4.4% of women and 0.9% of men reported unwanted sexual contact in the past year (Rock, Lipari, Cook, & Hale, 2010). Rates of sexual harassment are

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higher, with 34% of women and 6% of men reporting these experiences (Lipari et al., 2008). Among female veterans of the Iraq and Afghanistan wars who received health care in the Veterans Administration Health Care System, military sexual trauma rates are as high as 15% (Haskell et al., 2010; Kimerling et al., 2010). Furthermore, in previously deployed veterans, sexual harassment and sexual assault were suggestive of declines in postdeployment health and increase use of Veterans Affairs services (Bean Mayberry et al., 2011; Vogt et al., 2005; Wolfe, Schnurr, Brown, & Furey, 1994). Among recent war veterans with PTSD, women who experienced military sexual trauma had more comorbid mental health diagnoses than those who did not experience military sexual trauma (Maguen et al., 2012). Although research efforts have examined sexual stressors in military populations, these have been limited to specific subgroups (e.g., veterans, active duty Air Force women) and constrained by retrospective or cross sectional designs (Bostock & Daley, 2007; Kimerling et al., 2010; Martin, Rosen, Durand, Stretch, & Knudson, 1998; Street, Gradus, Stafford, & Kelly, 2007). To our knowledge, no study has examined the relation ship between deployment and sexual stressors with the opera tions in Iraq and Afghanistan among a population based sample of U.S. female service members. Understanding this relationship is imperative to help design interventions and guide future policy, and to reduce the presence of these stressors in the military.

The Millennium Cohort Study, a population based cohort of U.S. service members, provides a unique opportunity to examine this association between deployment to the recent conflicts and sexual stressors, while rectifying some previous research defi ciencies (Gray et al., 2002; Ryan et al., 2007). Thus, the study's main objective was to investigate deployment as well as other individual and environmental factors in relation to sexual harassment and sexual assault among U.S. military women.

Methods

Study Population

The Millennium Cohort Study, a large longitudinal study, was launched in 2001 to investigate health outcomes associated with military service (Gray et al., 2002; Ryan et al., 2007). Using an in depth questionnaire, occupational and life experiences are assessed prospectively at 3 year intervals. The cohort currently includes more than 150,000 members who enrolled during three separate cycles between 2001 and 2008. The methodology of the Millennium Cohort Study has been described previously (Ryan et al., 2007; Smith, 2009). This study population included women from the first panel, who provided informed consent, completed a baseline (2001 2003) and first follow up ques tionnaire (2004 2006), and had complete data. Because the focus of this study was to examine the possible association between deployment and sexual stressors, those who were separated from the U.S. military before baseline were excluded.

Sexual Stressors Metrics

At the 2004 2006 follow up assessment, participants were asked if they "suffered forced sexual relations or sexual assault" or "experienced sexual harassment" in the past 3 years. Based on their responses, participants were classified into one of four possible categories: a) Sexual assault and sexual harassment, b) sexual assault only, c) sexual harassment only, or d) no sexual stressor.

At the 2001 2003 baseline assessment, participants were also asked if they had "ever" experienced these events. Partici pants responding "yes" to either or both events were classified as having prior sexual stressors.

Deployment and Combat Experience

Deployment was ascertained from Department of Defense electronic military data documenting in and out of theater dates for personnel in support of the operations in Iraq and Afghanistan. Based on these files received from the Defense Manpower Data Center, the main exposure was deployment between baseline and follow up. Because it has been demon strated that combat experience increases the risk for post deployment adverse health outcomes (Hoge et al., 2004; Smith et al., 2008), participants were categorized as nondeployed, deployed without combat like experiences, or deployed with combat like experiences. Participants were considered to have deployed with combat like experiences if they reported personal exposure at follow up to at least one of the following: witnessing death; witnessing physical abuse; dead and/or decomposing bodies; maimed soldiers or civilians; or prisoners of war, or refugees. To control for earlier deployments, women who deployed before baseline, including 1) the 1991 Gulf War, 2) Bosnia, Kosovo, or Southwest Asia between 1998 and 2000, or 3) in support of the operations in Iraq and Afghanistan, were clas sified as having previous deployment experience.

Individual Vulnerability Factors

Problem drinking was assessed using baseline questions from the Primary Care Evaluation of Mental Disorders Patient Health Questionnaire (PHQ). Participants who reported one or more of five alcohol related problems in the last 12 months, such as driving a car after several drinks, were classified as having alcohol related problems. At baseline, women who reported drinking more than seven alcoholic drinks per week were considered to be heavy drinkers, and those consuming four or more drinks per occasion or day were considered binge drinkers, based on research indicating that drinking beyond this level may increase the risk for alcohol related problems (Criqui, 1998; Dawson, Grant, & Li, 2005; Goldberg, Mosca, Piano, & Fisher, 2001; Naimi et al., 2003; U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2005).

Baseline mental health status was assessed using data from the PTSD Checklist Civilian Version (PCL C) and the PHQ. Based on the 17 self reported PCL C items, participants were identified as screening positive for PTSD if they reported a moderate or higher level of at least one intrusion symptom, three avoidance symptoms, and two hyperarousal symptoms (criteria established by the *Diagnostic and Statistical Manual of Mental Disorders, 4th edition, text revision* [*DSM IV TR*]; American Psychiatric Association, 2000; Weathers, Litz, Herman, Huska, & Keane, 1993). Using the standardized PHQ scoring mechanisms, major depression, panic syndrome, and other anxiety syndromes were assessed at baseline (Spitzer, Kroenke, & Williams, 1999; Spitzer, Williams, Kroenke, Hornyak, & McMurray, 2000; Spitzer et al., 1994). Binge like eating disorders were assessed applying criteria from the *DSM IV TR* to PHQ questions regarding eating behaviors. Participants were classified as having a mental disorder if they screened positive for one or more of the

following conditions at baseline: PTSD, major depression, panic syndrome, other anxiety syndrome, or binge like eating disorder.

Because stressful life experiences, such as major financial problems or death of a family member, may be associated with sexual stressors, an aggregate variable was created to measure life stress before baseline (low, moderate, or severe life stress), which may have occurred before entering military service (Holmes & Rahe, 1967).

Demographics and Military Characteristics

Demographic and military specific data were obtained from Department of Defense electronic personnel files, including gender, birth date, highest education level, race/ethnicity, pay grade, service component (active duty and Reserve/National Guard), service branch (Army, Air Force, Navy/Coast Guard, and Marine Corps), and occupation. Marital status (single/widowed, married, separated/divorced before baseline, and separated/divorced since baseline) was based on self report, with personnel data used to backfill missing information as necessary.

Women who left military service between baseline and follow up were classified as separated; all other women who were serving in the military from baseline to follow up were classified as not separated.

Statistical Analysis

Descriptive and univariate analyses were conducted to compare demographic, military, and behavioral characteristics between the four sexual stressor categories. Multinomial logistic regression was used to ascertain independent associations between recent deployment experience and sexual stressors, after adjusting for demographics, military, and behavioral characteristics. Because it was plausible that prior sexual stressors might modify the relationship between recent deployment and recent sexual stressors, an interaction term was assessed. With the exception of basic demographics and the main exposures, variables that were not associated with the outcome ($p > .10$) and that did not confound the association of recent deployment experience with the outcome were removed from the final statistical model. Regression diagnostics were performed to assess collinearity among covariates, as well as goodness of fit tests. A subanalysis was conducted to examine the relationship between the five specific combat like experiences and the sexual stressors. All data analyses were completed using SAS, version 9.2 (SAS Institute, Inc., Cary, NC). We obtained written consent from all participants.

Results

Of the 14,672 women who completed a baseline and first follow up questionnaire, 816 who had separated from the military before baseline were excluded from the study. Of the 13,856 eligible participants, 524 did not complete the sexual stressor questions, 53 were missing the alcohol questions, 16 had missing demographic data, and 1 had missing combat experience data. Thus, the study population consisted of the remaining 13,262 women.

Characteristics of the study sample are shown in Table 1. The study population consisted of women, among whom 92% were born before 1980, 43% had a high school education or less, 50% were married, 64% were White non Hispanic, 73% were of enlisted pay grade, 50% were active duty members, 50% were in the Army, and 61% reported no previous sexual stressor.

Of the 13,262 participants, 1,362 (10.3%) reported at least one sexual stressor in the 3 year follow up period (Table 1). Of those, 1,089 (80.0%) reported sexual harassment, 121 (8.9%) reported sexual assault, and 152 (11.2%) reported both sexual harassment and assault. Thus, the 3 year cumulative incidence of sexual harassment was 9.4% (n 1,241) and sexual assault was 2.1% (n 273).

Approximately 20% of the women deployed between baseline and follow up; of these, 1,193 (44.1%) reported combat like experiences (Table 2). Women who were deployed who experienced combat reported the highest cumulative incidence of sexual harassment (19.9%) and sexual assault (4.0%) in the 3 year follow up period.

The results from the final multinomial logistic regression, adjusting for demographics, pay grade, service branch, occupation, mental disorders, life stressors, and prior sexual stressors are shown in Table 3. Because prior sexual trauma did not modify the relationship (p .89), no stratification was needed and prior sexual trauma was adjusted for in the final model. Combat deployment in support of the recent conflicts was significantly associated with sexual harassment (odds ratio [OR], 2.20, 95% confidence interval [CI], 1.84 2.64) and with both sexual harassment and sexual assault (OR, 2.47; 95% CI, 1.61 3.78), but not the sexual assault only category. Women who deployed before baseline had lower odds of sexual harassment and sexual assault (OR, 0.52; 95% CI, 0.31 0.89) compared with women who did not previously deploy.

In addition, the youngest women, born in 1980 or later, were more than five times more likely to report sexual assault, with or without sexual harassment, than those born before 1960. Female service members who reported prior sexual stressors were nearly three times as likely to report recent sexual assault and more than four times as likely to report recent sexual harassment or both sexual stressors compared with those who did not report prior assault. Women serving in the Marine Corps were twice as likely to report sexual stressors, whereas women serving in the Army had a 57% increased odds for sexual harassment compared with Air Force service members. Other characteristics associated with sexual stressors at follow up included marital status (separated or divorced since baseline), life stress, baseline mental disorders, occupation (combat specialists), and enlisted pay grade.

The subanalysis examining the relationship between the specific combat like experiences and sexual stressors revealed that each of the five items was significantly related to the sexual harassment outcome, but only “witnessing physical abuse” was significantly associated with the sexual assault outcome. This item was then removed from the definition of combat experience to test whether the association would remain significant in the primary model, and results were consistent.

Discussion

Over the past two decades, the role of women in the U.S. military has expanded, encompassing most occupations in the military to include combat support roles. Although much research has investigated the health of service members deployed in support of the operations in Iraq and Afghanistan, it has been challenging to address the experiences of female service members with regard to sexual stressors. This is among the first studies to investigate the association between recent

Table 1
Characteristics of Millennium Cohort Female Participants by Sexual Stressors Report in the Past 3 Years

Baseline Characteristics*	Study Sample (n 1,262), %†	No Sexual Stressor (n 11,900), n (%)	Sexual Harassment (n 1,089), n (%)	Sexual Assault (n 121), n (%)	Sexual Harassment and Assault, (n 152), n (%)
Recent deployment experience‡					
Nondeployed	79.6	9,603 (80.7)	764 (70.2)	88 (72.7)	103 (67.8)
Deployed without combat	11.4	1,358 (11.4)	119 (10.9)	17 (14.1)	17 (11.2)
Deployed with combat	9.0	939 (7.9)	206 (18.9)	16 (13.2)	32 (21.1)
Deployment experience before baseline§					
No	78.6	9,300 (78.2)	877 (80.5)	105 (86.8)	135 (88.8)
Yes	21.5	2,600 (21.9)	212 (19.5)	16 (13.2)	17 (11.2)
Birth year					
Before 1960	21.6	2,681 (22.5)	159 (14.6)	9 (7.4)	13 (8.6)
1960–1969	36.3	4,425 (37.2)	317 (29.1)	26 (21.5)	40 (26.3)
1970–1979	34.6	3,989 (33.5)	483 (44.4)	59 (48.8)	58 (38.2)
1980 or later	7.6	805 (6.8)	130 (11.9)	27 (22.3)	41 (27.0)
Education					
High school or less	43.2	4,950 (41.6)	603 (55.4)	73 (60.3)	106 (69.7)
Some college	26.4	3,191 (26.8)	246 (22.6)	26 (21.5)	31 (20.4)
Bachelor's or higher	30.4	3,759 (31.6)	240 (22.0)	22 (18.2)	15 (9.9)
Marital status‖					
Single/widowed	23.0	2,674 (22.5)	282 (25.9)	40 (33.1)	49 (32.2)
Married	49.8	6,157 (51.7)	381 (35.0)	26 (21.5)	34 (22.4)
Separated/divorced before baseline	12.4	1,459 (12.3)	152 (14.0)	8 (6.6)	20 (13.2)
Separated/divorced since baseline	14.9	1,610 (13.5)	274 (25.2)	47 (38.8)	49 (32.2)
Race/ethnicity					
White non-Hispanic	63.5	7,555 (63.5)	692 (63.5)	76 (62.8)	103 (67.8)
Black non-Hispanic	20.1	2,401 (20.2)	211 (19.4)	27 (22.3)	26 (17.1)
Other	16.4	1,944 (16.3)	186 (17.1)	18 (14.9)	23 (15.1)
Military pay grade					
Enlisted	72.9	8,533 (71.7)	886 (81.4)	101 (83.5)	141 (92.8)
Officer	27.2	3,367 (28.3)	203 (18.6)	20 (16.5)	11 (7.2)
Service component					
Reserve/National Guard	49.8	5,934 (49.9)	543 (49.9)	52 (43.0)	78 (51.3)
Active duty	50.2	5,966 (50.1)	546 (50.1)	69 (57.0)	74 (48.7)
Branch of service					
Army	50.3	5,830 (49.0)	688 (63.2)	61 (50.4)	95 (62.5)
Air Force	29.9	3,669 (30.8)	229 (21.0)	30 (24.8)	32 (21.1)
Navy/Coast Guard	17.9	2,197 (18.5)	138 (12.7)	22 (18.2)	16 (10.5)
Marine Corps	1.9	204 (1.7)	34 (3.1)	8 (6.6)	9 (5.9)
Occupation					
Combat specialists	6.6	771 (6.5)	83 (7.6)	11 (9.1)	3 (2.0)
Health care specialists	23.3	2,843 (23.9)	200 (18.4)	20 (16.5)	26 (17.1)
Functional support	43.3	5,185 (43.6)	456 (41.9)	42 (34.7)	62 (40.8)
Other	26.8	3,101 (26.1)	350 (32.1)	48 (39.7)	61 (40.1)
Separation from military¶					
No	88.6	10,565 (88.8)	956 (87.8)	105 (86.8)	129 (84.9)
Yes	11.4	1,335 (11.2)	133 (12.2)	16 (13.2)	23 (15.1)
Alcohol-related problems#					
No	92.2	11,055 (92.9)	953 (87.5)	104 (86.0)	119 (78.3)
Yes	7.8	845 (7.1)	136 (12.5)	17 (14.1)	33 (21.7)
Binge drinking and/or heavy weekly drinking**					
No	67.7	8,195 (68.9)	635 (58.3)	67 (55.4)	85 (55.9)
Yes	32.3	3,705 (31.1)	454 (41.7)	54 (44.6)	67 (44.1)
Positive screen for mental disorder††					
No	89.6	10,770 (90.5)	904 (83.0)	96 (79.3)	108 (71.1)
Yes	10.4	1,130 (9.5)	185 (17.0)	25 (20.7)	44 (29.0)
Life stress‡‡					
Mild	95.8	11,464 (96.3)	1,001 (91.9)	109 (90.1)	127 (83.6)
Moderate/severe	4.2	436 (3.7)	88 (8.1)	12 (9.9)	25 (16.5)
Prior sexual stressors§§					
No	61.1	7,713 (64.8)	314 (28.8)	45 (37.2)	35 (23.0)
Yes	38.9	4,187 (35.2)	775 (71.2)	76 (62.8)	117 (77.0)

* All variables, except race/ethnicity, service component, and separation from military, were significant at the $p < .05$ level.

† Percentages may not sum to 100 owing to rounding.

‡ Deployment defined as at least ≥1 days in support of the operations in Iraq or Afghanistan between baseline and follow-up. Combat deployment defined as reporting personal exposures to ≥1 of the following: Witnessing death, physical abuse, dead and/or decomposing bodies, maimed soldiers or civilians, prisoners of war, or refugees.

§ Deployed to ≥1 of the following: (1) The 1991 Gulf War, (2) Bosnia, Kosovo, or Southwest Asia between 1998 and 2000, or (3) in support of the operations in Iraq and Afghanistan before baseline.

‖ Assessed separated/divorced status using baseline and follow-up data; other marital categories assessed at baseline.

¶ Separated from the U.S. military service between baseline and follow-up.

Participants endorsed ≥1 of 5 alcohol-related problems in the last 12 months, such as driving a car after consuming several drinks.

** Participants reported consuming >7 drinks per week, ≥4 drinks per day/occasion at baseline.

†† Participants screened positive at baseline for ≥1 of the following conditions: Posttraumatic stress disorder, depression, panic or other anxiety syndrome, or disordered eating.

‡‡ Using similar scoring mechanism introduced by Holmes and Rahe, life stress was based on reporting major financial problems, violent assault, severe illness or death of a family member or loved one, and disabling illness or injury at baseline.

§§ Participants who reported ever experiencing sexual harassment or sexual assault at baseline.

Table 2
Three-Year Cumulative Incidence of Sexual Stressors among Female Participants by Recent Deployment Status

Recent Deployment Status*	Study Sample (n 13,262), n†	Sexual Harassment (n 1,241), n (%)	Sexual Assault (n 273), n (%)
No deployment	10,558	867 (8.2)	191 (1.8)
Deployment without combat	1,511	136 (9.0)	34 (2.3)
Deployment with combat	1,193	238 (19.9)	48 (4.0)

* Deployment defined as at least ≥1 days in support of the operations in Iraq or Afghanistan between baseline and follow-up. Combat deployment defined as reporting personal exposures to ≥1 of the following: Witnessing death, physical abuse, dead and/or decomposing bodies, maimed soldiers or civilians, prisoners of war, or refugees.

deployment experiences and sexual stressors among U.S. military women.

This study found that women who deployed to the current operations with combat like experiences had significantly greater odds of reporting sexual harassment or both sexual harassment and assault, after adjustment. Women who experi ence combat while deployed are not only in more stressful and dangerous circumstances, but they may also find themselves in more traditionally male dominated environments compared with other deployed women. Furthermore, in these high stress and often life threatening environments, prioritizing the iden tification and prevention of sexual stressors may be more chal lenging, perpetrators may be less concerned with the consequences of committing assault, and perpetrators may be less likely to be held accountable for their actions. Although this study could not determine the specific timing of the stressors, 70% of the women reported that the most recent sexual stressor occurred during a year coinciding with a time they were deployed. However, some combat deployed women may be victims of sexual stressors either before or after deployment. Previous research indicates an association between combat experience and risky driving after deployment, so it is conceiv able that women who experience combat may be more likely to engage in other risky behaviors when they return from deploy ment, which may increase their risk for sexual stressors (Fear et al., 2008).

The findings from a subanalysis revealed that each of the five combat items (e.g., witnessing death, witnessing physical abuse) was significantly associated with recent sexual harassment. This may suggest that these experiences are coupled with violent environments where people are likely to aggress against military women.

Interestingly, those who had deployed before baseline were at reduced odds of reporting recent sexual stressors; however, this association was only significant with regard to reporting both recent sexual stressors. Women who had previously deployed may have developed or enhanced coping skills that were helpful in avoiding future harassment and assault. Conversely, this finding may be a selection effect, in that female victims of unwanted sexual experiences may be more likely to leave the military (Sadler, Booth, Cook, Torner, & Doebbeling, 2001).

Some of our findings regarding sociodemographics corre spond with previous research, such as the increased risk of sexual stressors with younger age (Coyle, Wolan, & Van Horn, 1996; Street, Strafford, Mahan, & Hendricks, 2008). It was also expected that marriage would be a protective factor. Those recently separated or divorced were at increased risk, but no increased risk was seen among those separated or divorced before baseline. It is possible that women who separated or divorced before baseline had more time to develop effective ways of coping with or avoiding situations that increase the likelihood of harassment or assault.

Consistent with previous research, this study found a strong association between prior sexual stressors and recent sexual stressors. Prevailing opinion suggests that the mechanisms explaining this association are complex and need to encompass consideration not just of the victim but also of the aggressor (Elwood et al., 2011; Kapur & Windish, 2011; Lalor & McElvaney, 2010; Mosack et al., 2010). Socialization, health, culture, religion, economics, and psychological processes all may play roles in explaining this association (Sadler, Booth, Mengeling, & Doebbeling, 2004). In addition, a strong association between previous life stressors and sexual stressors was found. Further analysis showed that although each component of the life stressors metric was associated with sexual stressors, history of violent assault was most influential in this relationship. These results are similar to other work indicating an association between physical assault and sexual assault (Busch Armendariz, DiNitto, Bell, & Bohman, 2010; Mohammadkhani, Forouzan, Khooshabi, Assari, & Lankarani, 2009).

Previous research has documented an association between mental disorders and sexual stressors in military populations, which is similar to the association we found (Kimerling, Gima, Smith, Street, & Frayne, 2007; Murdoch et al., 2007). Because of the cross sectional design of previous studies, however, it has not been fully established whether prior mental health morbidity increases the risk for experiencing these stressors. Our findings found that those who screened positive for a mental disorder at baseline, such as PTSD or depression, were at an increased risk for experiencing sexual stressors. These women may be more vulnerable because of their mental status and/or perpetrators may be more likely to aggress against women with these conditions.

Consistent with a previous report (Lipari & Lancaster, 2003), enlisted women, combat specialists, and Army soldiers had significantly increased odds of reporting sexual harassment; female Marines were significantly more likely to report all sexual stressors. The increased risk of sexual stressors among Marines, soldiers, and combat specialists may be related to these women being embedded in environments with a higher proportion of men. This may create a more masculine oriented environment, which perhaps facilitates sexual stressor events. That is, this type of environment may decrease the willingness of women to report incidents of sexual stressors to military commanders; therefore, the leaders may believe that sexual stressors are not prevalent and that additional efforts to prevent these stressors are unnecessary. In addition, perpetrators may believe that there are few or no consequences for their actions.

The percentage of deployers reporting sexual harassment in a 3 year follow up period for this study (9% without combat experience and 20% with combat experience) was lower than prior studies of female service members. For example, rates of sexual harassment over a 1 year period were found to be between 24% and 66% among women who deployed to the 1991 Gulf War (Carney et al., 2003; Kang, Dalager, Mahan, & Ishii, 2005; Wolfe et al., 1998) and 24% to 34% among women serving in the Armed Forces (Lipari et al., 2008; Lipari & Lancaster, 2003). Rates in this current study are lower than that reported for U.S. civilian women, although accurate esti mates for the latter are difficult to obtain (Charney & Russell,

Table 3
Adjusted Odds of Reporting Sexual Stressors Compared with Reporting of No Sexual Stressors among Female Millennium Cohort Participants (n 13,262)

Baseline Characteristics	Sexual Harassment (n 1,089), AOR (95% CI)	Sexual Assault (n 121), AOR (95% CI)	Sexual Harassment and Assault (n 152), AOR (95% CI)
Recent deployment* experience†			
Nondeployed	1.00	1.00	1.00
Deployed without combat	1.12 (0.91–1.39)	1.16 (0.67–2.00)	1.20 (0.70–2.06)
Deployed with combat	2.20 (1.84–2.64)‡	1.46 (0.84–2.55)	2.47 (1.61–3.78)‡
Deployment experience before baseline§			
No	1.00	1.00	1.00
Yes	0.87 (0.74–1.03)	0.60 (0.35–1.03)	0.52 (0.31–0.89)‡
Birth year			
Before 1960	1.00	1.00	1.00
1960–1969	1.10 (0.89–1.36)	1.53 (0.70–3.34)	1.63 (0.85–3.12)
1970–1979	1.63 (1.32–2.01)‡	3.17 (1.49–6.76)‡	1.99 (1.03–3.85)‡
1980 or later	1.95 (1.45–2.61)‡	6.11 (2.55–14.65)‡	5.33 (2.54–11.19)‡
Education			
High school or less	1.00	1.00	1.00
Some college	0.95 (0.79–1.15)	0.94 (0.54–1.64)	0.82 (0.50–1.35)
Bachelor's or higher	0.97 (0.76–1.24)	0.84 (0.38–1.88)	0.66 (0.31–1.41)
Marital status‖			
Single/widowed	1.00	1.00	1.00
Married	0.70 (0.59–0.83)‡	0.39 (0.23–0.65)‡	0.42 (0.27–0.67)‡
Separated/divorced before baseline	1.17 (0.93–1.47)	0.61 (0.27–1.35)	1.05 (0.59–1.88)
Separated/divorced since baseline	1.54 (1.27–1.86)‡	2.06 (1.33–3.21)‡	1.54 (1.01–2.36)‡
Race/ethnicity			
White non-Hispanic	1.00	1.00	1.00
Black non-Hispanic	0.93 (0.78–1.10)	1.24 (0.78–1.98)	0.78 (0.50–1.23)
Other	1.05 (0.88–1.27)	0.99 (0.58–1.69)	1.16 (0.72–1.86)
Military pay grade			
Enlisted	1.31 (1.02–1.68)‡	0.85 (0.38–1.89)	1.95 (0.83–4.57)
Officer	1.00	1.00	1.00
Branch of service			
Army	1.57 (1.30–1.89)‡	0.92 (0.54–1.55)	1.15 (0.71–1.87)
Air Force	1.00	1.00	1.00
Navy/Coast Guard	0.93 (0.73–1.19)	1.03 (0.54–1.94)	0.72 (0.37–1.41)
Marine Corps	2.03 (1.33–3.10)‡	2.93 (1.22–7.04)‡	3.03 (1.30–7.03)‡
Occupation			
Combat specialists	1.43 (1.07–1.91)‡	1.48 (0.67–3.24)	0.38 (0.11–1.29)
Health care specialists	1.00	1.00	1.00
Functional support	1.03 (0.85–1.24)	0.90 (0.52–1.58)	0.88 (0.54–1.43)
Other	1.18 (0.97–1.44)	1.35 (0.78–2.35)	1.16 (0.71–1.90)
Positive screen for mental disorder¶			
No	1.00	1.00	1.00
Yes	1.30 (1.09–1.56)‡	1.58 (0.99–2.52)	2.14 (1.47–3.13)‡
Life stress#			
Mild	1.00	1.00	1.00
Moderate/severe	1.40 (1.08–1.80)‡	2.44 (1.28–4.66)‡	2.95 (1.81–4.79)‡
Prior sexual stressors**			
No	1.00	1.00	1.00
Yes	4.34 (3.77–5.00)‡	2.90 (1.97–4.25)‡	5.35 (3.61–7.93)‡

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval.

* Deployment defined as at least ≥1 days in support of the operations in Iraq or Afghanistan between baseline and follow-up. Combat deployment defined as reporting personal exposures to ≥1 of the following: Witnessing death, physical abuse, dead and/or decomposing bodies, maimed soldiers or civilians, prisoners of war, or refugees.

† Model adjusted for all variables in the table. Service component, separation from military, alcohol-related problems, and binge/heavy drinking were removed from the final model because they were not associated with the outcome and did not confound the association between deployment and sexual stressors.

‡ Statistically significant.

§ Deployed to ≥1 of the following: (1) The 1991 Gulf War, (2) Bosnia, Kosovo, or Southwest Asia between 1998 and 2000, or (3) in support of the operations in Iraq and Afghanistan before baseline.

‖ Assessed separated/divorced status using baseline and follow-up data; other marital categories assessed at baseline.

¶ Participants screened positive at baseline for ≥1 of the following conditions: Posttraumatic stress disorder, depression, panic or other anxiety syndrome, or disordered eating.

Using similar scoring mechanism introduced by Holmes and Rahe, life stress was based on reporting major financial problems, violent assault, severe illness or death of a family member or loved one, and disabling illness or injury at baseline.

** Participants who reported ever experiencing sexual harassment or sexual assault at baseline.

1994). However, this study only used one question to assess sexual harassment, whereas many previous studies have used multi item survey instruments, which tends to increase case finding (Fisher & Cullen, 2000).

The percentage of women reporting sexual assault in a 3 year period in this study (3% among deployed) was comparable to a nationally representative sample of women who deployed to the 1991 Gulf War (Kang et al., 2005). For nondeployed service women, recent estimates of sexual assault over a 1 year time frame have ranged from 2% to 5% in nationally representative and subsamples of female service members (Bostock & Daley, 2007; Cunradi, Ames, & Moore, 2005; Lipari et al., 2008; Lipari & Lancaster, 2003).

Strengths and Limitations

This is the first study to analyze the association between deployment in support of the operations in Iraq and Afghanistan and sexual stressors in a large, population based cohort of military women, including those who serve in the Reserves and National Guard. Numerous investigations for potential biases have found the Millennium Cohort to be representative of mili tary personnel and suggest data reporting is reliable with minimal non response bias (Chretien, Chu, Smith, Smith, & Ryan, 2007; LeardMann, Smith, Smith, Wells, & Ryan, 2007; Riddle et al., 2007; Ryan et al., 2007; Smith, Leard, Smith, Reed, & Ryan, 2007; Smith, Wingard, et al., 2007; Smith, Jacobson, Smith, Hooper, & Ryan, 2007; Smith, Zamorski, et al., 2007; Wells et al., 2008). Recall errors may also have been reduced, since outcome information was collected within a relatively short period (3 years) of the event(s). Furthermore, information regarding individual vulnerability factors was collected before measuring the outcome, avoiding the problems of retrospective recall that can bias results when information about outcomes and risk factors are collected simultaneously. This study also addressed potential confounding by prior sexual stressor experiences by controlling for such history in our analyses. Although we relied on self reported symptoms and not a clinical assessment, the PCL C and PHQ may have actually more accu rately capture those with mental health symptoms than actual clinical diagnoses or hospitalization data, because many indi viduals with mental health disorders do not seek treatment (Hoge et al., 2004).

This study also had several limitations. The sexual stressor questions on the Millennium Cohort questionnaires capture events that have occurred during the 3 year follow up period, so it was not possible to ascertain whether these events occurred before, during, or after deployments. However, 70% of women reported the most recent sexual stressor event happening during the year they were deployed. In addition, no information was collected on the perpetrators, so we were not able to identify or characterize these individuals. Although unlikely, we cannot eliminate the possibility that the association found between combat deployment and sexual stressors could be related to reporting error, in that women who report combat experience may also be more likely to report sexual stressors. Because abbreviated measures that lack detailed descriptions or defini tions were used to assess sexual stressors, and because unwanted sexual experiences may carry a stigma, participants may under or over report traumatic events; further, recall of traumatic events may be imperfect and influenced by the assessment process itself (Krinsley, Gallagher, Weathers, Kutter, & Kaloupek, 2003). Although the combat like experiences were reported to have occurred during a time coinciding with deployment, the questions are not specific to deployment; therefore, it is possible that these events did not occur during deployment. Last, the PCL C and PHQ were used to assess mental disorders, and although they are standardized and validated instruments, they cannot stand in for a clinical diagnosis and thus, may misclassify mental health status.

Implications for Practice and Policy

Understanding the factors that contribute to sexual stressors is the first step in designing and evaluating interventions aimed at reducing these stressors in the military. Our findings indicate that some of the risk factors for sexual stressors are related to the type of environment (e.g., combat experience, branch of service), whereas others are related to individual risk and resiliency factors (e.g., age, marital status, mental health conditions). In designing and testing interventions to prevent sexual stressors, it may be practical to target these environments, as well as focus on enhancing resiliency factors in younger women, those newly separated or divorced, and those with positive mental health screens. Sexual stressors are not unique to the military. Chal lenges have been well described among young women in university and occupational settings (Brown et al., 2011; Connor, Gray, & Kypri, 2010). Military occupations, however, clearly provide a complicated and unique set of stressors when opera tional deployments are considered. The recent change to open positions to women whose primary mission is to engage in direct combat is likely to increase the numbers of women serving in combat roles and those deployed with combat (U.S. Department of Defense and Joint Chiefs of Staff, 2013). Therefore, it is critical, now more than ever, to evaluate ways to prevent and eliminate sexual stressors in these environments that are associated with increased risk of sexual stressors. Programs to prevent sexual harassment and assault in civilian communities have resulted in minimal or mixed success (Vladutiu, Martin, & Macy, 2011), and the military has recognized that a sustained effort to eliminate sexual stressors is necessary. The U.S. Department of Defense has developed programs in recent years, with mandatory training at all levels that also use social media tools to prevent sexual assault against both female and male service members, yet more steps need to be taken to mitigate sexual stressors in the military (U.S. Department of Defense, 2008, 2010). Because increased formal reporting of sexual stressors is one measure of programmatic success, public health policymakers will be chal lenged to measure actual effectiveness of programs in reducing sexual harassment or assault. Through continued assessments and studies, such as the Millennium Cohort, prospective collec tion of self reported information on sexual stressors is essential for continued focus and measuring progress.

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Combat Deployment is Associated With Sexual Harassment or Sexual Assault in a Large, Female Military Cohort?

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14. ABSTRACT

Previous studies have examined the prevalence, risk factors, and health correlates of sexual stressors in the military, but they have been limited to specific subpopulations. Furthermore, little is known about sexual stressors' occurrence and their correlates in relation to female troops deployed to the current operations in Iraq and Afghanistan. Participants included Millennium Cohort female participants who completed a baseline (2001–2003) and follow-up (2004–2006) questionnaire. Self-reported and personnel data were used to investigate the relation between recent deployment and sexual stressors using multivariable analyses. Main outcome measures were incident sexual harassment, sexual assault, or both were assessed using two questions at follow-up. Of 13 262 eligible participants, 1362 (10.3%) reported at least one sexual stressor at follow-up. Women who deployed and reported combat experiences were significantly more likely to report sexual harassment (odds ratio [OR], 2.20; 95% confidence interval [CI], 1.84–2.64) or both sexual harassment and sexual assault (OR, 2.47; 95% CI, 1.61–3.78) compared with nondeployers. In addition, statistically significant risk factors for sexual stressors included younger age, recent separation or divorce, service in the Marine Corps, positive screen for a baseline mental health condition, moderate/severe life stress, and prior sexual stressor experiences.

15. SUBJECT TERMS
Sexual harassment, sexual assault, cohort studies

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